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GEOLOGY—No. I.

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IN a previous essay, I presented a brief sketch of the history of Geology, up to the period when it became a practical science; or in other words, until it became a subject of fact and observation and rational induction, instead of fancy and conjecture and hypothesis. The present article I intend as the first of a series of essays embracing a general view of the outlines of the science. A few remarks on the character and merits of the study may be introduced with propriety in this place.

So far from being that abstract and speculative science which those who are ignorant of it often suppose it to be, geology is full of useful application to the common pursuits of life. The agriculturist, the miner, the architect—every employment that has a direct relation to the materials of our globe, derives advantages from geological knowledge. It cannot be otherwise, when geology involves an acquaintance with all the substances which enter into the composition of the accessible portions of the earth.

But the most striking and the most beautiful application of this science to useful practical purposes, depends on the principles of stratification hereafter to be explained. For the present I will only remark, that the superficial portion of our planet is found to be stratified, or composed of distinct strata

of various materials; and that these strata are proved to occupy a uniform position relative to each other. Mineral salt occurs in one of these strata associated with gypsum or plaster of Paris. Where one of these valuable minerals is found, the presence of the other may therefore be suspected. But the stratum containing them is superior in its situation to crystallized limestone, to slate and to granite. It follows, that wherever the exposed surface of the earth consists of either of those rocks, gypsum and rock salt do not exist; and a search for them would therefore be fruitless. In searching for coal and other mineral productions, similar principles are called into application, and prove a valuable aid to the miner. For want of the knowledge of a few of these elementary principles of geology, much time and labor and money have been wasted in attempting to discover substances of value in situations where they could not exist.

But I am far from resting the claims of this or any other branch of science upon the applicability of its truths and principles to the useful arts. Important as may be the various departments of study, when regarded in that point of view, it is beneath the dignity of the human mind to estimate their value by such a standard. If the mind, and not the purse, makes the man, it follows that the merits of a science depend principally on its influence upon the intellect. Viewed in this light, geology assumes an exalted station. No scientific pursuit confers on the student superior advantages. It awakens a disposition to observe and establish facts. It exercises and strengthens the powers of reflection. It points the understanding constantly and forcibly to the beautiful relations of cause and effect—effects as simple and as grand, as the causes that produced them are palpable and sublime.

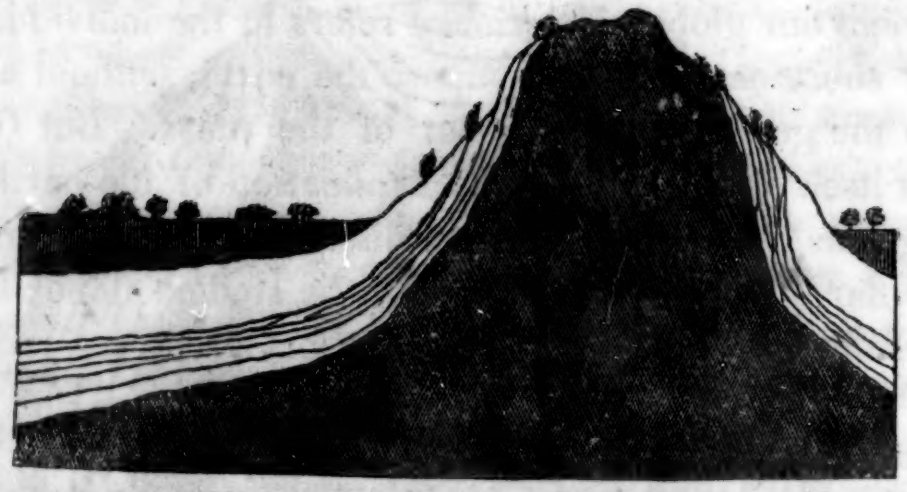
Having made these preliminary remarks, I will now proceed to the subject. It is scarcely necessary to say that my essays will be written with a view to accommodate them to those who are entirely uninformed with respect to the science of which they treat.

Definition and derivation of the term.—The term Geology is derived from two Greek words; γε, (*ge*) the earth, and λωγος,

(*logos*) word or science. It is the science which treats of the structure of our globe. *Mineralogy* refers to the individual portions or substances which compose the earth, without any regard to the general arrangement of the mass. But *Geology* confines itself principally to an examination of the earth, considering it as a mass composed of dissimilar parts, arranged in a particular order. The former may be studied alone; but the latter involves some knowledge of the former.

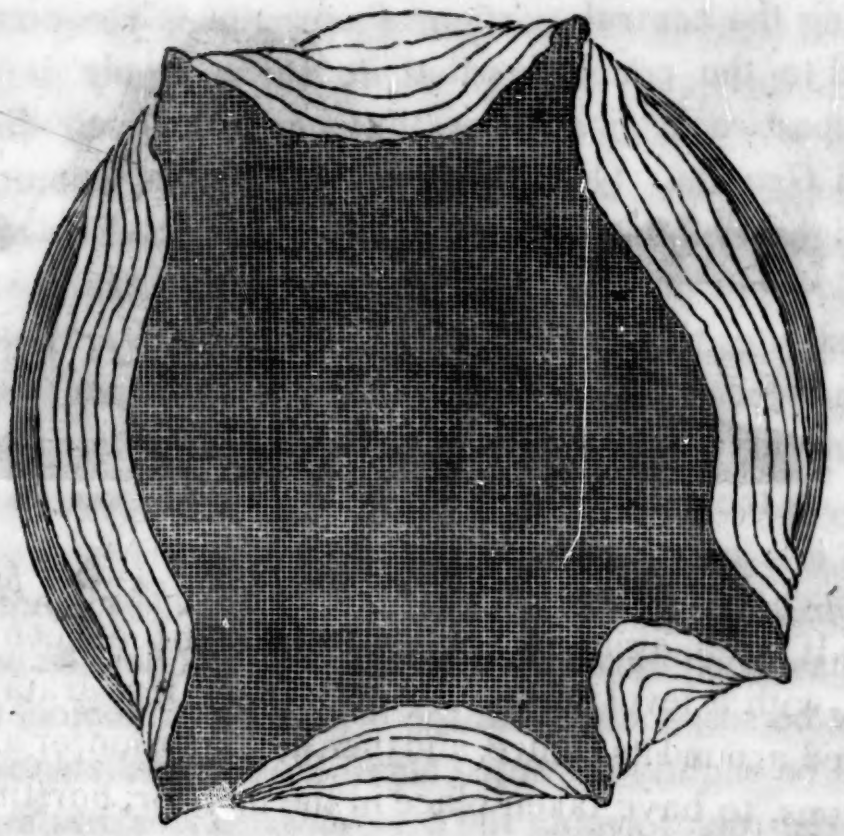
General idea of the earth's structure.—Those who are totally unacquainted with geology, would be apt to think the earth a body homogeneous in its structure, or constructed of stones, clay and water, intermingled, as it were, at hazard. But this view is very erroneous. It is true, we have no knowledge, except of the superficial parts forming the crust of our planet. This crust, however, is ascertained to consist of a series of layers or strata, some of which almost surround the globe. In this respect it is often compared to an onion, whose coats represent the strata. These strata are not, like the coats of the onion, extended in an even, continuous manner, over the whole circumference of the earth, but are frequently broken or interrupted by mountains, or by collections of water. Sometimes one of the strata *runs out*, or terminates abruptly, without any evident cause. Frequently one district of country contains a stratum of a peculiar nature, not found elsewhere. When the extent of such a layer is very limited, it is called a *bed*.

Arrangement of the strata in a mountain.—If we ascend a mountain, we shall soon perceive a kind of rock not visible in the valley at its base, though at the same time existing there, at some distance beneath the surface. Rising higher on the mountain, we meet with another kind of rock, which was still deeper in the valley than the last. Finally, the summit is formed of a material which lay furthest from the surface in the valley. The annexed figure will explain this description.



Position of the strata, such as would be caused by explosive force.—If we imagine our planet to have once been a perfect sphere, with a level surface, composed of the strata regularly arranged around its centre, and then an explosion, or a number of explosions, to have taken place in the interior, bursting through the strata and elevating them in some parts into mountains, in other parts depressing them into hollows, forming the beds of seas or lakes, we shall have no very inaccurate image of the present condition of the exterior of the earth. The natural consequence of such an eruption would be the protrusion, at the place of bursting, of those strata which were before hidden under the surface; and the top of the projecting ridge would be made up of those materials which had previously been nearest to the earth's centre. By referring to the subjoined cut, the reader will perceive at a glance, what would be the result of the supposed explosive force. It is not my design at present to advance any opinion as to the reality of such an event. I mention it only in illustration of the subject.

The figure is supposed to represent a section of the earth, made parallel to the equator, between the latitudes of 40° and 50° North. The dark portions on the sides indicate the two great oceans, the Pacific on the left and the Atlantic on the right, separated by the American continent in which are seen the Rocky and Alleghany mountains. Beyond the Atlantic are observed—first, the Alps, then the Circassian range, and finally the Himlaya mountains.



Sources and extent of our actual knowledge respecting the earth's structure.—Our globe has never been penetrated by miners, more than a mile in perpendicular depth. The knowledge thus obtained, together with that derived from the inspection of mountains, and the effects of floods and currents of water, lead us to believe, that we are tolerably certain with regard to so much of the earth as lies within four or five miles of its surface. But what is this compared with its whole thickness? Not one thousandth part! The direct and positive knowledge of the geologist, with respect to the central portion of our planet, is therefore proportional to the knowledge we should gain concerning the interior of a common sized school globe, by scratching through the coat of varnish on its surface. The geologist has been moreover, most invidiously compared, as to the extent of his researches, to a mosquito attempting to ascertain the structure of an elephant, by boring through his hide. Should the mosquito succeed in piercing the skin of the elephant to a depth equal to one fourth the length of his little proboscis, the comparison between the extent of his labors, and those of man on our planet, would be nearly exact.

Centre of the earth.—Although we have no direct information respecting the central portion of our globe, yet certain facts have led to the conclusion that its surface only is stratified. The deepest rock, or stratum, that has ever been discovered, is called *Granite.* Granite also composes the summits of most of the highest mountains. Hence it is presumed by many, that this rock is not only the foundation on which all the others rest but constitutes the whole of the interior of the earth. It must be acknowledged, however, that any conclusions respecting the nature of the deep seated and central parts of our globe, founded on the data which geologists now possess, is little better than idle speculation.

Specific gravity of the earth.—The specific gravity of our planet has been nearly ascertained. If a leaden weight or plummet be suspended from the brink of a precipice, the plummet will be slightly attracted out of the perpendicular direction, toward the rock forming the precipice. By estimating exactly this force, and taking into view some other data, it is calculated that the specific gravity of the earth is about five; or that the globe is about five times heavier than its bulk of water.

Symmes' Theory.—But the mean specific gravity of the materials which compose the surface, is only three. Hence it follows that the interior of the earth must be composed of heavier substances than its superficial portion. Any one is at liberty to exercise himself in reconciling this fact with captain Symmes' theory, which supposes our planet to be hollow.

Position of the strata generally uniform.—As a general observation, the strata always preserve the same position relative to each other. Thus, gypsum or plaster of Paris, and salt, are commonly found associated together, in a series of strata, forming what is called the gypsum formation. This formation has never been found beneath the formation which contains stone coal. On the contrary, wherever gypsum and coal have been discovered to exist in the same portion of country, the gypsum is observed to occupy a situation above the coal. Hence, a geologist would decide in a moment, that to search for salt under the coal beds in the valley of the Schuylkill and Lehigh, would be the extreme of folly.

Geological History of the Creation.—By far the most interesting portion of geological inquiry relates to the inferences derived from the situation, structure, and composition of the strata, and the various remains of animals and vegetables which are found imbedded in them. This investigation discloses a valuable history of our earth—a history in its very nature indisputable, and written in characters so simple, that he who runs may read. When we discover in the middle of a continent, the relics of myriads of animals of the shell-covered tribes, that dwell in the sea, what proof more conclusive can we require, that the waves of the ocean once covered the spot? When we see imbedded in a rocky mass, the trunks of trees, deprived of their branches and broken and torn, and the bones and mangled forms of fish and other animals, who can avoid the conviction that these are the monuments of a terrible catastrophe which carried with it death and destruction? In some of the strata we find positive demonstration of their slow and gradual formation; and equally conclusive is the evidence presented by others, that they were the result of causes, sudden and rapid in their operation. In comparing the order of their formation with the remains of vital existence entombed in these strata, every one must be convinced that there was a day when the waters covered the face of the earth—that at a subsequent period the lower orders of the animal world started into being—that the more perfect tenants of land began their existence at a later day—and that man was the last creature into which was breathed the breath of life.

In my next number I will pursue the subject, remarking, for the present, that although the reader may find in these introductory observations nothing very interesting, yet he can scarcely fail to acknowledge in the prosecution of his inquiries into the science, that geology is a study not only beautiful, but sublime.

SKETCH OF THE HISTORY OF THE WHALE.

Class I. MAMMALIA—*Order* IX. CETACEA.

EXTENSIVE as are the purposes to which animals of this order are applied over all the civilized world, our knowledge of their history is so imperfect, that we are in doubt as to the number of species in the family of the whale; or whether the species of the southern are identical with those of the northern ocean.

To such an extent has man prosecuted his warfare against them, that from having been the common tenants of every sea, their empire is now restricted to the icy region of the poles; and these animals whose natural lives Buffon supposes a thousand years can scarcely compass,—judging from the life of the carp, which attains the age of a century,—are now but seldom destined to outlive the tenth portion of this period. Their dimensions, according to some authors, have been known to attain three hundred feet in length, and their weight upwards of 300,000 pounds; yet now they are not often found one fourth the size.

So much for the continued persecution against this giant of the waters; and it is not a matter of surprise that the imagery of an ignorant age should have represented such a mighty mass of living body as a destructive monster, the size of whose prey was in proportion to its own magnitude. This was the Kraken of the ancients, which was reported to be many thousand yards in length. When extended, it appeared like an extensive shore, presenting the appearance of a ledge of rocks: if it moved, its arms were thrown out as immense masts. From its pores exuded an abundant fluid, which attracted its prey; and as a mighty volcano, moving under the sea, its back was opened to engulph the legions of fish and mollusca thus lured within its reach.

But without dwelling on fables, we will proceed to examine what truth has developed in relation to our subject. To Lacepéde the world is indebted for having carefully abstracted history from the fictions of the age, and adding much original

information to our stock of the knowledge of the Cetaceæ. Scoresby, too, stimulated by a similar zeal, spent much time in the northern oceans, and gave important contributions to the subject. From these naturalists our principal information is to be derived; and their descriptions may be regarded as almost the only ones which can be relied on, among many which purport to be the chronicles of the singular history of the whale. The reader is also referred to Cuvier's Animal Kingdom, and the Dictionnaire des Sciences Naturelles, for more particulars than we can here properly give.

The whale is not a fish. His organization entitles him to a place in the same elevated scale of creation which man himself holds. Though the extreme shortness of his neck, by which scarcely any diminution in the thickness of the body can be observed, the absence of the posterior members, the obliteration of the hands and fingers, and the inferior development of the organs of sense, contribute to assign his station among the least perfect, and the last of the Mammalia. They respire through lungs, and hence the necessity of frequently approaching the surface of the water for a supply of air; their blood is red and warm, they have two ventricles and two auricles to the heart; they are viviparous, and suckle their young: these, together with other details of their anatomy are sufficient to distinguish them from fishes.

But though thus far removed from man, with the diminutive construction of their external senses leading us to suppose that they are also the lowest of the class in point of intelligence, yet we know not how far they are endowed with that instinctive capacity to provide for the evils and to enjoy the blessings of life. With the ocean for an empire, and her caverns for a home, it requires but little effort for the whale to overcome the vicissitudes of climate, and satiate every want of nature. And when we consider them in a social capacity, we are brought to acknowledge that there are features in their character, bespeaking the existence of those attributes which are connected with the functions of mind. Their habits of collecting and living together in bands, their affection to each other, as well as that between male and female, and more than all, the pa-

rental care and anxiety and attachment they display towards their offspring, leading them to brave every danger, and to combat every foe in their defence, frequently at the cost of their own lives, all give convincing evidence of this.

If the numerous relics of antediluvian mammalia now found, are calculated to astonish us with their magnitude, how much greater would be our surprise while surveying a living animal more than fifty times the size of the great mastodon! Such is the whale, which, as before stated, some respectable writers contend has no doubt been seen upwards of three hundred feet in length, and weighing more than 300,000 pounds. Among the individuals of this species, which are met with a great distance from the Arctic Pole, some are found at the present time from 60 to 120 feet, with a circumference a little exceeding the half of their total length. But we must not imagine that all whales receive from nature dimensions so considerable; frequently they are but 20 or 30 feet long. In shape, too, they vary greatly; some exhibiting that of an immense and irregular cylinder, and others that of two cones having their bases placed together. But in general terms, they may be said to resemble a more or less perfect ellipse.

The conformation of the two jaws is not similar in all the species. Sometimes they are nearly of the same length, sometimes the upper exceeds the lower, and in other cases the lower jaw the upper one. Some terminate in a point, and others have their edges rounded and festooned. The aperture of the mouth is sometimes immense. Duhamel-Dumonceau relates that a common whale, captured in the bay of Somme in the year 1726, though but 70 feet long, had so wide a mouth that two men might enter it without stooping; in some *Rorquals* it is said to be so large that fourteen men might stand upright in its interior. The gullet, however, is much narrower than might be imagined from the enormous size of the mouth; it varies from two to five inches in diameter. The œsophagus, or tube which conducts the food to the stomach, is nine feet in length.

The two bones of the lower jaw, form, by their union, a portion of a circle or ellipse, from four and twenty to eight and twenty feet in diameter. In the gallery of anatomy in the mu-

seum of Paris, are three maxillary or jaw bones of the animal, eight and twenty feet long.

The tongue is usually thick, fleshy, fat, soft and spongy. It is sometimes twenty-seven feet long, and from nine to twelve feet wide, yielding more than six casks of oil. In some species it is covered with a thin and smooth skin, while in others it is rough: its color is almost invariably white, with dark spots on the sides. Though adhering to the lower jaw, it is susceptible of some motion. Certain species can raise, swell and extend it to the end of the muzzle. In some, the base of this organ is covered with a loose skin, extending toward the root, over the orifice of the gullet, and rendering the entrance there so narrow that fish of a moderate size cannot pass down. It is well known that many of the most formidable tenants of the ocean, are as fond of having the tongue of the whale as its rightful owner.

The brain of the whale is small in proportion to the great size of its body. In the common balæna it is only one twenty-five thousandth part of its whole weight, while in man it is one fortieth, and in all quadrupeds of which we have a correct estimate, and particularly in the elephant, it is below the five-hundredth part.

The eye is an organ worthy of attentive consideration. That which excites the greatest astonishment, is its extreme smallness in proportion to the enormous volume of the head and body. In the common whale, the diameter of the eye is scarcely the one hundred and ninety-second part of the total length of the animal. It is situated in a small convexity which is more elevated than the lips, thus permitting the animal to direct this organ so as to consider an object somewhat remote, and to see it with both eyes at once. The eyes are widely separated, and placed immediately above the commissure, or juncture of the lips, and consequently very near the shoulder. The crystalline is tolerably convex before and spherical behind, and in general conformed like that of fishes. The eye, situated in most of the Balænæ equally remote from the spiracles or blowers and the extremity of the muzzle, is furnished with lids like those of other mammalia, from which, however, they dif-

fer in being almost immoveable, in consequence of the quantity of oily fat which inflates the interior: there are no eye lashes.

The general form of the eye is maintained in a great measure by the exterior envelope called the sclerotica, from a Greek word signifying *hardness*, which, instead of being simply attached to the cornea by a cellular membrane, usually penetrates into the corneous substance, by long and fine ligaments.* In the choroid, or membrane situated under the sclerotica, are observable the apertures of the vessels, and also the internal membrane called Ruyschian; the radiating fibres which are disposed circularly and surround the crystalline, can even be counted. The pupil is susceptible of contraction, and of becoming a transversal elongated aperture, by means of the dilatation of the iris. It is moved by four straight muscles, and by another called the suspension muscle, which is divided into four; there are, moreover, two oblique muscles, superior or inferior. In common with the majority of aquatic animals, the Balænæ have no lachrymal glands. Their place is supplied by two sorts of lacunæ, or channels, situated under the upper lid, from which distils a thick and mucilaginous humor.

Every natural philosopher is aware, that the more obliquely the luminous radii fall on a diaphanous body, the more they are refracted in traversing it: also, that the refraction of the rays of light is greater through a sphere than through a flattened lens. Now, the crystalline of the whale presents a degree of sphericity, density and inflammability, occasioned by the oily substance with which it is impregnated; in a word, it has such a degree of refracting force, that it compensates the defect of refraction in the water.

The whale can hear comparatively feeble sounds at a great distance. The meatus auditorius is very wide, and the Eustachian tube of great diameter. When the animal swims along the surface of the ocean, the ear is often eight or ten feet below the level of the water, and the aqueous fluid being a most ex-

* The sclerotic membrane consists of two parts, the white and the transparent; designated by the names of *cornea opaca* and *cornea transparens*. It is into this coat of the eye that the muscles of the bulb are inserted.

cellent conductor of sound, it transmits the most feeble ones to a great distance.

The internal ear is composed of a labyrinth, three semicircular canals, a cochlea, a cochlearian orifice, a vestibulum, a vestibulary orifice, a tympanum, a membrani tympani, articulated osselets, a Eustachian tube, a canal, which running from the membrane of the tympanum opens in a small hole externally, and is terminated by no vestige of external ear.

On the first consideration of the spiracles of the Balænæ, we would be tempted to suppose the animal totally deprived of the sense of smell, since there are neither crypta nor mucous follicles, nor projecting laminæ, nor do these organs communicate with any sinus, nor exhibit any apparatus adapted for the transmission of odorant sensations. Their interior is covered with a dry skin of little sensibility, and capable of resisting with impunity the repeated currents of salt water with which they are deluged. It is certain, however, that the whale can distinguish the degree and qualities of odors at a great distance. Lacepéde cites a curious anecdote in proof of this position:

The Vice Admiral Pleville-le-Peley, being one day at sea with his fishers, perceived some whales above the horizon. He prepared to avoid them, but a quantity of cod which was in the boat having spread there a great quantity of stinking and putrid water, the admiral ordered this water to be thrown into the sea. The whales instantly made off and disappeared. He tried this experiment several times on the approach of the whales, and invariably with the same result.

The Eustachian tube furnishes an interior communication from the tympanum to the mouth, and then ascends toward the summit of the spiracle, into the cavity of which it terminates; the part of this tube which is near the ear, exhibits at its external face a tolerably large hole, opening into an empty space. This hollow is prolonged into different sinuses, and these sinuses and this cavity are lined with a blackish, and tender mucous membrane. Now the odorous emanations easily penetrating to this hollow and these sinuses, through the orifice of the spira-

cle, through the aperture of the mouth, or the Eustachian tube, we may presume that the seat of smell resides therein.

The name of spiracles has been given to the two canals situated toward the middle of the great vault of the head, a little behind that part where a hump is raised on which their orifices are situated. They proceed from the bottom of the mouth, traverse obliquely and in a curved direction the interior of the head, terminating toward the middle of the upper part. These organs, however, do not preserve the same form and situation in all the Balænæ. In some they have the form of two crescents with the convexities opposed, and a little separated from each other; in others they are two apertures completely circular, sometimes remote from each other, and sometimes they seem to form but one and the same orifice, the external diameter of which is about the one hundredth part of the total length of the individual.

The spiracles answer the purpose of expelling the water which enters into the mouth, and they also serve as the respiratory organs of the animal. In the former case, the volume of water ejected, is sufficiently great to fill a boat almost instantly. It is sent forth with amazing rapidity, and particularly when the whale is agitated by any violent feeling, the noise is so great as to astonish those who have heard it for the first time. It is said that the jets are sometimes forced to a height of thirty or forty feet, and that they impart a motion to the surface of the sea perceptible at the distance of two thousand yards.

The organ by which the whale thus expels the water is composed of two large membranous pouches, imbedded under the skin, in front of the orifices with which they communicate. Some very strong fleshy fibres, proceeding from the circumference of the cranium, unite above these pouches and compress them violently at the will of the animal. When he wishes to rid himself of the water in his mouth, he swallows it, but at the same time closes the pharnyx, and forces the fluid to ascend into the spiracles, where it raises, by the movement impressed upon it, a fleshy valve placed in the spiracle itself, toward its superior extremity below the pouches. The water then enters

into these pouches; the valve closes and prevents the water returning to the mouth, and the animal compressing the pouches with violence, ejects the water to a height proportioned to the force of the compression.

The skin of the whale is without scales, tubercles or hairs, and is very strong, though penetrated by a multitude of large pores. In certain species it exceeds more than eight inches in thickness. The epidermis which covers the true skin, is very smooth, porous, and composed of several layers. In the rays of the sun it shines like polished metal, owing to the oil with which it is penetrated. This oil, besides diminishing the rigidity of the skin, preserves it from those injurious changes which it might otherwise experience by the alternate sojourn of the animal under water and on its surface.

The mucous tissue which separates the epidermis from the true skin, is thicker than in other mammifera. Its color, which is communicated to the epidermis, varies much in individuals of the same kind, as well as in those of different species, by reason of age, sex, and probably the temperature of the usual habitat. In some, it is of a pure and deep black; in others, of a black, shaded with gray. Many species are half brown and half white, while the under parts of the body are of a dazzling white. Almost all the whales of Spitzbergen are entirely white. Some Cetacea are irregularly marked with white upon a black or gray ground; but this appears to be the result of wounds which have become cicatrized.

The flesh is reddish, coarse, hard and dry, by no means agreeable to the taste, and impregnated with an unpleasant odor. Between the flesh and skin is a coat of fat, sometimes more than a foot in thickness upon the head and neck. A part of this fat is so liquid that it forms oil without undergoing the process of expression.

The quantity of blood which circulates in the whale is greater in proportion than in quadrupeds. The diameter of the aorta sometimes exceeds thirteen inches. In a large sized whale, the amount of blood cannot be less than twenty or twenty-five thousand pounds. The heart is broad and flattened. The animal has a voluminous liver, a spleen of no great extent, pan-

creas very long, bladder middling size and elongated. The stomach of the whale, instead of being divided into four cavities, as in the Ruminantia, is formed of five very distinct and separate sacs or pouches.

We will now proceed to give a concise view of the bony structure of these immense animals. Even while young, the parietal bones adhere closely to the temporal and occipital, and form a capacious vault, whose breadth is about half its length. On opening the cranium, the interior of its base is almost level. Considered externally, the two orbital foramina, which form a communication between the cavity of the orbit of the eye and the nasal fossa, are very small in the common whale, and covered by osseous laminæ. Occiput articulated by large condyles to the dorsal spine. Cervical vertebræ seven; dorsal sixty-three, which when placed together appear like an immense bean, forty-two or forty-six feet in length. The last next the caudal fin, 19 inches in diameter. There are 15 ribs on each side, which are sometimes 20 feet long; the upper of these are articulated to the sternum. The clavicles have no analogy with those of other mammifera. A shoulder blade nine feet long is in the National Museum of Paris. Humerus short, in proportion to the size of the animal, rounded toward the summit, and marked by a small tuberosity. Ulna and radius much compressed laterally; carpus of five bones, almost all hexagonal, disposed in two ranges of three and two pieces. Bones of the metacarpus similarly formed, soldered together, the five digits not having the same number of phalanges.

Bones forming the pectoral fin so articulated that they cannot move one upon the other, for there are no muscles to turn the fore arm, and the bones are so united by long cartilages, which sometimes envelope half of them, and leave no suppleness to the organ which they contribute to form; proving that the arms of the whale were intended as fins or oars, and not for the purpose of seizing or retaining objects.

With these general views of the structure of the whale, we will proceed in our next number to give a more detailed account of the species, and the manner of capturing and preparing the various substances useful to man, of which they are constituted.

W. P. G.

EXPERIMENTS AND OBSERVATIONS ON THE COLORS USED IN PAINTING BY THE ANCIENTS.

[From Paris' Life of Sir Humphrey Davy.]

During the winter of 1815 while Sir H. Davy was in Rome, he instituted a diligent inquiry into the composition of ancient colors, with the most satisfactory results. As this subject is of an interesting character, we publish the accompanying abstract from a paper he read before the Royal Society :

Although the paintings of the great masters of Greece have been entirely destroyed, either by accident, by time, or by the barbarian conquerors at the period of the decline and fall of the Roman empire, yet there is sufficient proof that this art attained a very high degree of excellence amongst a people to whom genius and taste were a kind of birthright, and who possessed a perception, which seemed almost instinctive, of the dignified, the beautiful, and the sublime.

The experiments of our author were made upon colors found in the Baths of Titus, and the ruins called the Baths of Livia, and in the remains of other palaces and baths of ancient Rome, and in the ruins of Pompeii.

By the kindness of his friend Canova, who was charged with the care of the works connected with the ancient art in Rome, he was enabled to select, with his own hands, specimens of the different pigments that were found in vases discovered in the excavations made beneath the ruins of the palace of Titus, and to compare them with the colors fixed on the walls, or detached in fragments of stucco; and Signor Nelli, the proprietor of the "Nozze Aldobrandine,"* permitted him to make such experiments upon the colors of that celebrated picture, as was necessary to determine their nature.

Without entering into the chemical details of the subject, I shall offer a general history of the nature of the colors he examined.

* The most celebrated picture of antiquity rescued from the ruins of Herculaneum. It represents a virgin on her marriage night, with her female attendants An engraving of it is to be seen in Sir William Hamilton's work on Herculaneum

Of the red colors, he distinguished four distinct kinds, viz.—one bright and approaching to orange, which he found to be *minium*, or the red oxide of lead; a second, dull red, which he ascertained to be an iron ochre; a third, a purplish red, which was likewise an ochre, but of a different tint; and a fourth, a brighter red than the first, which was *vermilion cinnabar*, or a sulphuret of mercury. On examining the fresco paintings in the Baths of Titus, he found that all the three first colors had been used, the ochres particularly, in the shades of the figures, and the minium in the ornaments on the borders. The fourth red had been employed in various apartments, and formed the basis of the coloring of the niche, and of other parts of the chamber in which the Laocoon is said to have been found in the time of Raphael; a circumstance which Davy considers as being favorable to the belief that such apartments were intended for imperial use, since vermilion, amongst the Romans, was a color held in the highest esteem, and was always one of great costliness.

Of the yellows, the more inferior were mixtures of ochre and different quantities of chalk; the richer varieties were ochres mixed with the red oxide of lead.

The ancients had also two other colours, which were orange, or yellow; the auripigmentum, or αρσενικον, said to approach to gold in brilliancy of its tint, and which is described by Vitruvius as being found native in Pontus, and which Davy says was evidently sulphuret of arsenic; and a pale sandarach, said by Pliny to have been found in gold and silver mines, and which was imitated at Rome by a partial calcination of cerusse. He conceives that this must have been *massicot*, or the yellow oxide of lead mixed with minium; I suspect, however, that Davy was mistaken in supposing that the ancients always applied the term Sandarach to minium; the Σανδαραχη of Aristotle was evidently an arsenical sulphuret.

In his examination of the ancient frescoes, he could not detect the use of orpiment; but a deep yellow, approaching to orange, which covered a piece of stucco in the ruins near the monument of Caius Cestius, proved to be oxide of lead, and consisted of massicot and minium. He considers it probable

that the ancients used many colors from lead of different tints, between the "*usta*" of Pliny, which was our minium, and imperfectly decomposed cerusse, or pale massicot.

The differently shaded blues, by the action of acids, uniformly assumed the same tint; from which he concluded that the effect of the base was varied by different proportions of chalk. This base he ascertained to be a *frit*, made by means of soda and sand, and colored by oxide of copper.

The greens were, in general, combinations of copper; and it seemed probable, that although they appeared in the state of carbonate, they might originally have been laid on in that of acetate. The purple of the ancients, the πορφορα of the Greeks, and the *ostrum* of the Romans, was regarded as their most beautiful color, and was obtained from shell-fish. Vitruvius states that it was prepared by beating the fish with instruments of iron, freeing the purple liquor from the shell containing it, and then mixing it with a little honey. Pliny says that, for the use of the painters, *argentine creta*, (probably a clay used for polishing silver,) was dyed with it, and both Vitruvius and Pliny state that it was adulterated, or imitations of it made by tinging *creta* with madder; whence it would appear, that the ancients were acquainted with the art of making a lake color from that plant, similar to the one used by modern painters.

Pliny informs us, that the finest purple had a tint like a deep colored rose. In the baths of Titus, there was found a broken vase of earthenware, which contained a pale rose color; and Davy selected it as an appropriate subject for his analytical experiments.

Where this color had been exposed to the action of the air, its tint had faded into a cream color, but the interior parts retained a lustre approaching to that of carmine. A diluted acid was found to dissolve out of it a considerable quantity of carbonate of lime, with which the coloring principle must have been mixed, as a substance of a bright rose color remained after the process. This coloring ingredient was proved to contain siliceous, aluminous and calcareous earths, without any sensible trace of metallic matter, except oxide of iron. Upon heating the substance, first in oxygen, and then with hyperoxymuriate

of potash. Davy was induced to consider the coloring matter itself as either of vegetable or animal origin; the results, however, were so equivocal, that he renounced the hope of determining its nature from the products of its decomposition. If it be of animal origin, he thinks it is most probably the Tyrian or marine purple, as it is likely that the most expensive color would have been employed in ornamenting the imperial baths.

He had not observed any color of the same tint as this ancient lake in the fresco paintings; the purplish reds in the baths of Titus he ascertained to be mixtures of red ochres and the blues of copper.

The blacks and browns were mixtures of carbonaceous matter, with the ores of iron or manganese. The black from the baths of Titus, as well as that from some ruins near the Porta del Popolo, deflagrated with nitre, presented all the character of carbon. This fact agrees with the statements of all the ancient authors who have described the artificial Greek and Roman black as consisting of carbonaceous matter, either prepared from the powder of charcoal, from the decomposition of resin, (a species of lampblack,) from that of the lees of wine, or from the common soot of wood fires. Pliny also mentions the inks of the cuttle-fish, but adds, "*Ex his non fit.*"

Davy informs us that, some years before, he had examined the black matter of the cuttle-fish, and had found it to be a carbonaceous substance mixed with gelatine.*

Pliny, moreover, speaks of ivory black invented by Apelles; of a natural fossil black; and of a black prepared from an earth of the color of sulphur. Davy is of opinion, that both these latter pigments were ores of iron and manganese; and he observes that the analysis of some purple glass satisfied him that the ancients were well acquainted with the ores of manganese.

The *whites* which he examined from the baths of Titus, as well as those from other ruins, were either chalk, or fine aluminous clay; and he states that, amongst all his researches, he never once met with cerusse.

* I find from a note addressed by Davy to Mr. Underwood, that he was engaged in these experiments in October 1801.

This interesting account of the colors used by the ancients is followed by observations on the manner in which they were applied; and the paper is concluded with some general remarks of much practical importance.

The azure, he says, of which the excellence is sufficiently proved by its duration for 1700 years, may be easily and cheaply imitated; he found, for instance, that fifteen parts of carbonate of soda, twenty parts of opaque flint powdered, and three parts of copper filings, by weight, when strongly heated together for two hours, yielded a compound substance of exactly the same tint, and of nearly the same degree of fusibility; and which, when powdered, produced a fine deep sky blue.

The azure, the red and yellow ochres, and the blacks, appear to have been the only pigments which have not undergone any change in the fresco paintings. The vermilion presents a darker hue than that of recently made Dutch cinnabar; and the red lead is inferior in tint to that sold in the shops. The greens are generally dull.

The blue frit above mentioned, he considers as a color composed upon the truest principles; and he thinks there is reason to believe, that it is the color described by Theophrastus as the one manufactured at Alexandria. "It embodies," says he, "the color in a composition like stone, so as to prevent the escape of elastic matter from it, or the decomposing action of the elements upon it." He suggests the possibility of making other *frits*, and thinks it would be worth while to try whether the beautiful purple given by oxide of gold could not be made useful in a deeply tinted glass.

Where *frit* cannot be employed, he observes that metallic combinations which are insoluble in water, and which are saturated with oxygen or some acid matter, have been proved by the testimony of seventeen centuries to be the best pigments. In the red ochres, for example, the oxide of iron is fully combined with oxygen and carbonic acid; and the colors composed of them have never changed. The carbonates of copper, which consist of an oxide and an acid, have suffered but little alteration. Massicot and orpiment, he considers as those which have been the least permanent amongst all the mineral colors.

He next takes a view of the colors which owe their origin to the improvements of modern chemistry. He considers the *patent yellow* to be more permanent, and the chromate of lead more beautiful, than any yellow possessed by the Greeks or Romans. He pronounces *Scheele's green*, (arsenite of copper,) and the insoluble muriatic combinations of copper, to be more unalterable than the ancient greens; and he thinks that the sulphate of baryta offers a white far superior to any pigment possessed by the ancients.

In examining the colors used in the celebrated Nozze Aldobrandine, he recognized all the compounds which his analytical inquiries had established, viz.: the reds and yellows were all ochres; the blues, the Alexandrian frit; the greens, copper; the purple, especially that in the garment of the Pronuba, appeared to be a compound color of red ochre and copper; the browns and blacks were mixtures of ochres and carbon; while the whites were carbonate of lime.

"The great Greek painters," he adds, "like the most illustrious artists of the Roman and Venetian school, were probably sparing in the use of the more florid tints in historical and moral painting, and produced their effects rather by the contrasts of coloring in those parts of the picture where a deep and uniform tint might be used, than by brilliant drapery.

"If red and yellow ochres, blacks and whites, were the pigments most employed by Protogenes and Apelles, so they are likewise the colors most employed by Raphael and Titian in their best style. The St. John and the Venus, in the tribune of the gallery at Florence, offer striking examples of pictures in which all the deeper tints are evidently produced by red and yellow ochres, and carbonaceous substances.

"As far as colors are concerned, these works are prepared for that immortality which they deserve; but unfortunately, the oil and the canvass are vegetable materials, and liable to decomposition, and the last is even less durable than the wood on which the Greek artists painted their celebrated pictures.

"It is unfortunate that the materials for receiving those works which are worthy of passing down to posterity as eternal monuments of genius, taste, and industry, are not imperishable

marble or stone:* and that *frit*, or unalterable metallic combinations have not been the only pigments employed by great artists; and that their varnishes have not been sought for amongst the transparent compounds† unalterable in the atmosphere.

* Copper, it is evident from the specimens in the ruins of Pompeii, is a very perishable material; but modern science might suggest some voltaic protection.

† Davy thinks that the artificial hydrate of alumina will probably be found to be a substance of this kind; and that, possibly, the solution of boracic acid in alcohol will form a varnish. He also thinks, that the solution of sulphur in alcohol is worthy of an experiment.

From the Entomological Magazine.

OBSERVATIONS ON BLIGHT.

(CONTINUED.)

I don't know why our brethren on the other side the Atlantic are charged with sending us the greatest pest of our orchards, but so it is. We call an insect the American blight, which for aught I could ever make out, may have come from China or Botany Bay. However, a name once in vogue will have its day; and one might as well attempt to turn a pig in an entry as argue against an established belief; so American blight it shall be. In very hot weather you may now and then see this blight on the wing; it has just the look of a bit of cotton, or a downy seed, floating in the air, and is driven by every breath of wind quite as readily. If you catch and examine it, you will find it to be just like the plant-louse which infests our rose-trees, &c.; but, unlike all other plant-lice, it is clothed and muffled up with cotton-wool, in such quantities, that you would at first have no more idea that the lump contained an insect, than that the mass of clothes on a stage-coach box in winter, contained a man. Some folks wonder what can be the use of so much clothing; I am not much of a theorist, but I should guess that the vermin came from the torrid zone, and Nature

kindly furnishes this garment to protect them from the cold o our climate.

These blights wander wherever it pleases the wind to carry them; and if bad luck should drive one of them against the branch of an apple-tree, there it will stick, creep into a crack in the bark, bring forth its young, and found a colony; the white cotton soon appears in large bunches; branch after branch becomes infected; the tree grows cankery, pines, and dies. How this is effected no one knows, though the cause and effect are too evident to escape the notice of the commonest clown. In large orchards it is vain to hope for a cure, but not so in gardens. Directly you see the least morsel of cotton, make up your mind to a little trouble and you will get rid of it. In the first place, get a plasterer's white washing brush, then get a large pot of double size, make your man heat it till it is quite liquid; then go with him into the garden and see that he paints over every patch of white, though not bigger than a sixpence; the next morning have the size-pot heated again, and have another hunt; and keep on doing so every morning for a fortnight. Your man will tell you it's no use; tell him that's your business not his: your neighbors will laugh at you for your pains: do it before they are up. I have tried it and know it to be effectual. Spirit of tar has been used with partial effect, so also has resin. white washing has been often tried, and as it contains some size, is not entirely useless, and some horticulturists think it ornamental; I do not.

Now for the moth. This is a beautiful little creature, its wings are studded with silvery shining specks, as though they were inlaid with precious gems. It is most beautiful of the beautiful tribe to which it belongs, yet from its habits not being known, it is seldom seen in the moth state, and the apple-grower knows no more than the man in the moon to what cause he is indebted for his basketsful of worm-eaten windfalls in the stillest weather. To find the moth in the daytime, the trunks of the apple-trees should be carefully looked over; or if your orchard be surrounded by a wooden fence, it may frequently be found sitting against it, with its pretty wings neatly folded round it. Towards evening, in fact, just at sunset, it begins to move, and

may then be seen hovering about the little apples, which, by the time the moth leaves the chrysalis, the middle of June, are well knit, and consequently fit for the reception of its eggs, which it lays in the eyes, one only in each, by introducing its long ovipositor between the leaves of the calyx, which form a tent above it that effectually shields it from the inclemency of the weather, or any other casualty. As soon as the egg hatches, the little grub gnaws a hole in the crown of the apple, and soon buries itself in its substance; and it is worthy of remark that the rind of the apple, as if to afford every facility to the destroyer, is thinner here than in any other part, and consequently more easily pierced. The apple most commonly attacked is the codling, a large early sort, which ripens in July and August.

The grub, controlled by an unvarying instinct, eats into the apple obliquely downwards, and by thus avoiding the core and pips in no way hinders its growth; at first it makes but slow progress, being little bigger than a thread, but after a fortnight its size and its operations have much increased; it has now eaten half way down the apple, and the position of the hole at the top, if the apple continue upright, or nearly so, is inconvenient for a purpose it has up to this time been used for, that is, as a pass to get rid of its little pellets of excrement, which are something like fine sawdust or coarse sand; another communication with the outer air is therefore required, and it must be so constructed as to allow the power of gravity to assist in keeping it clear; it is accordingly made directly downwards toward that part of the apple which is lowest, and thus the trouble of thrusting the pellets upwards through the eye of the apple is saved, and a constant admission given to a supply of air without any labor. The hole now made is not, however, sufficiently open for an observer to gain by its means any knowledge of what is going on within; this is only to be obtained by cutting open a number of the apples as they gradually advance toward ripeness; the hole is, however, very easily seen, from its always having adhering to it on the outside an accumulation of the little grains which have been thrust through. Having completed this work the grub returns toward the centre of the apple, where he feeds at his ease,

When within a few days of being full fed, he for the first time enters the core through a round hole gnawed in the hard, horny substance which always separates the pips from the pulp of the fruit, and the destroyer now finds himself in that spacious chamber which codlings in particular always have in their centre. From this time he eats only the pips, never again tasting the more common pulp, which hitherto had satisfied his unsophisticated palate; now nothing less than the highly flavored, aromatic kernels will suit his tooth, and on these for a few days he feasts in luxury.

Some how or other, the pips of an apple are connected with its growth, as the heart of an animal with its life; injure the heart, an animal dies; injure the pips, an apple falls. Whether the fall of his house gives the tenant warning to quit, I cannot say, but quit he does, and that almost immediately; he leaves the core, crawls along his breathing and clearing-out gallery, the mouth of which, before nearly closed, he now gnaws into a smooth, round hole, which will permit him free passage without hurting his fat, soft, round body; then out he comes, and for the first time in his life finds himself in the open air. He now wanders about on the ground till he finds the stem of a tree; up this he climbs, and hides himself in some nice little crack in the bark. I should remark, that the fall of the apple, the exit of the grub, and his wandering to this place of security usually take place in the night time. In this situation he remains without stirring for a day or two, as if to rest himself after the uncommon fatigue of a two yards' march; he then gnaws away the bark a little in order to get further in out of the way of observation; and having made a smooth chamber big enough for his wants, he spins a beautiful little milk-white silken case, in which, after a few weeks, he becomes a chrysalis, and in this state remains throughout the winter and until the following June, unless some unlucky, blackheaded tit, running up the trunk, peeping into every cranny, and whistling out his merry see-saw, happen to spy him, in which case he is plucked without ceremony from his retreat, and his last moments are spent in the bird's crop; but supposing no such ill fortune betide him, by the middle of June he is again on the wing, and hovering round the young apples on a midsummer evening as before.

By burning weeds in your gardens at this time of year you will effectually drive away this little moth. If you have trees the crops of which you value, make a smoking (mind, not a blazing,) fire under each: it will put you to some inconvenience if your garden be near your house, but the apples will repay you for that.

THE MOON HAVING TO TRAVERSE A RESISTING MEDIUM.

In the second number of the Advocate we published an essay on the secular irregularities of the motion of the moon, in reply to a correspondent who had written several articles on that planet having to traverse a resisting medium. The indulgence of our readers is requested once more on the same topic, inasmuch as our correspondent thinks that he has been treated unjustly by not having his communication published: for in professing to give a general view of his paper, we dismissed the subject by "not giving any view of it all; except that the arguments are not strictly applicable to the point." To satisfy him on this score, we copy his first article: the other in reply to S. A., he must excuse us for not publishing, inasmuch as he misunderstands the position assumed by the former correspondent; and besides, very few of our present readers know any thing about what has been published in the old series of the Advocate on this subject; consequently, if we commence on this, the whole ground would have to be traversed anew.

It is left for our readers to decide, whether an error was committed, in saying that the arguments of L. H. P. were not strictly applicable to the subject. We repeat it, that they are not. Because the proper object of theories *is to account for effects which have been developed;* but the effects to which he alludes, have been accounted for on the laws of physics; hence, the explanation which we gave is not theory—*it is doctrine.* Therefore, L. H. P. has *no data whatever* to which he

can apply his theory, save what can be derived from the facts of the orbits of the comets of Biela and Encke, gradually approaching the form of a circle. This, says our correspondent, is evidence of a resisting medium pervading all space. So says Herschell; that it is "the effect which would be produced by a resistance experienced by the comet from a very rare etherial medium pervading the regions in which it moves; for such resistance, by diminishing its actual velocity, would diminish also its centrifugal force, and thus give the sun more power over it to draw it nearer;" the ultimate consequence of which will be, that the comet must fall into the sun, should it not be dissipated altogether, which is not improbable, when we consider the lightness of its materials, and that at every appearance it is becoming less conspicuous. This is the solution proposed by Encke, and it is generally received.

But what evidence have we of the truth of this theory? If these comets are drawn into the body of the sun, and thus made to terminate their existence as comets, we must infer that the sun is the centre of this resisting medium. And this medium you may call what you will; light, or heat, or electricity, or atmosphere; its constitution has nothing to do with the question as it now stands; all we want is evidence of its existence. And if the sun is thus the centre of a resisting medium, and if it has such an effect on one or two bodies traversing our system, it must have the same effect upon *all* bodies which have the sun as a focus, round which they revolve. Hence, all the planets connected with our system are doomed to destruction. A conclusion utterly at variance with that beautiful law of order which has been so lucidly propounded by Lagrange and others, that so long as the present powers which exist in the universe, operate as they heretofore have, producing changes in the motions and orbits and periodic times, of the heavenly bodies in one succession of ages, and in another giving a compensation by which they are restored to their original condition, so long will the vitality of the whole system of creation be coexistent with that eternal Power, which said "let there be light and there was light."

But if the sun is not the centre of this medium, what body is? No depth of philosophy is necessary to perceive that it can be in none of our planets; it must then have its focus in a point without the limits of the solar system. But as so much space has already been traversed in seeking for it, and as we have not found it in a region with which we are somewhat acquainted, it is much less likely that it can be detected among worlds and systems of which we know nothing. Therefore, we let this pass; and after asking the question, if it be not a rational idea, that these comets are regulated by the same laws as our planets, and like them have their secular eccentricities, by which the major and transverse axes of their orbits are alternately contracted and enlarged, we must express our willingness to permit the question to repose till the destiny of these comets are known. True, we may not be here at the time: but we hope to rest contented with the labors of those who frame doctrines to account for effects; and to be preserved from constructing theories from the imagination, with the *expectation* of finding facts to corroborate them.

The following is the essay of L. H. P. Much more might be said in reply, but we refrain:

The first thing I shall notice, is what the editor says respecting the materiality of light and heat. In a previous communication, I remarked that if the demonstrations of La Place are of such a character as to preclude the possibility of the presence of *atmospheric* resistance at the moon, they must, with equal certainty, apply to every other *material* resistance; and must prove, either that light and heat are not present at the moon, or that they are not material. The editor says he cannot see the force of this argument upon those who hold the opinion that light and heat are material; and intimates the possibility that matter may exist in such a manner, as not to resist other matter. For myself, I cannot conceive of such a possibility. To suppose that the moon, or any other body, can pass through a mass of *matter* without being resisted by it, is no less than to suppose either that matter (light and heat) can exist without weight, or that one body is not in the way of the other;

in other words, that two bodies can exist in the same place at the same time.

The remarks about electricity, as I apprehend, do not fortify the argument at all. There is no more probability,—perhaps there is less,—that *electricity* is material, than that light and heat are. And were it otherwise, we certainly cannot pretend to decide what amount of resistance it may oppose, till we can contrive to *weigh* it, and thereby have at least *one* datum for determining its momentum. On the whole, it appears to me that the conclusion must be irresistible, either that light and heat are not material, or that they must resist, and consequently cause the moon to approximate the earth.

But the main question respects *atmospheric* resistance, rather than that of light and heat. Now if the editor's suggestion be true, that matter may be so modified as to "oppose no mechanical force to the passage of bodies," then it would avail nothing if I could prove that the atmosphere extends to the moon. For it is just as philosophical to suppose that the moon may traverse the *atmosphere* without resistance, as any other *material* substance. Whether it does or does not extend so far, is a point which, probably, we shall not be able to decide. If the atmosphere is *infinitely elastic*, the editor admits that in spite of gravity it must extend much farther than the moon. But then he *believes* that its elasticity is not infinite—that it has a limit. It may be so; but there is no certainty; and *I think* no evidence of it. If there is a limit, it is incorrect to say, that a vessel can never be perfectly exhausted by an air-pump. It is just as philosophical, for ought I can see, to suppose that a *perfect vacuum* may be obtained, first in the upper part of the vessel, and then gradually downwards to the bottom, like the discharge of water, as that such a state of things can exist any where else.

L. H. P.

PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

November 4th.

Dr. Burrough presented a specimen of ASTERIAS *helianthus*, and six species of snakes from India.

J. Pierce presented a specimen of calcareous spar, from Chester county.

Mr. C. Martin—a collection of plants from Egypt, comprising twenty species.

A work on the Morbid Anatomy of the Brain, by Robert Hooper, M. D. London, was presented by the author.

Les Principes de la Methode Naturelle, appliqui aux maladies de la peau. Par Chas. Martin.

Advocate of Science and Annals of Natural History, No. 3. Presented by the editor.

Foster on the Atmosphere, 3d edition; Annals of Alpine and Ærial Voyages; Circle of the Seasons, for 1829. Presented by T. Forster.

Journal of the Academy of Natural Sciences, vol. vii. part 1st. By the Publication Committee.

Decades tres Plantarum Novarum, Chinæ Boreali et Mongoliæ Chinensi incolarum, auctore Nicolas Turezaninow. Presented by Mr. T. E. Fisher, of St. Petersburg.

Dr. R. Coates read a paper on the genus Physalia, and other analogous genera, with remarks on the functions of some of their organs &c., being a commentary on the remarks of Cuvier and Lamarck. Referred to a committee—Drs. Morton, Pickering, and Mr. Conrad.

Dr. Hays announced to the meeting the death of Mr. Thomas Say; and on motion of Dr. Hays, it was

Resolved, That the Academy has heard with deep regret the loss which science and this society have sustained in the death of our respected member, Thomas Say, Esq.

Resolved, That the above resolution be communicated to the family of Mr. Say, with the expression of our sympathy for their loss.

On motion of Dr. Harlan, it was

Resolved, That a member be appointed to write a biographical Sketch of Mr. Say. Mr. Conrad, who was nominated, having declined, Dr. Benj. H. Coates was then nominated and appointed for that purpose.

November 11*th.*

Donations.—Head of a Sus *babiroussa*, four species of Diodon, and the jaw of a Squalus. By Capt. David Gissinger, U. S. N.

Six species of Cypræa, from India; two specimens of VERMITES *lucubricalis*; two species of Bulimus, by Mr. Jos. Clark.

Directions for collecting botanical specimens, by J. Reddell.

The secretary read from the Dictionaire d'Histoire Naturelle some observations on the teeth of sharks, and Mr. Rogers made some remarks on the same subject, with reference to geological facts.

The chairman having alluded to the collection of observations of Professor Olmstead, on the meteoric phenomena of last year, and his hypothesis, pointed out a notice of the zodiacal light now visible, which he presumed to be from the pen of Professor Olmstead, and to which he invited the attention of the members.

November 18*th.*

Donations.—Voyages dans les Alpes &c. By H. de Saussure. Presented by Dr. R. E. Griffith.

Professor A. D. Bache made some remarks on the theory of Professor Olmsted, respecting the meteors of Nov. 13th, 1834, alluded to at the last meeting, and stated that on Sunday he had observed the zodiacal light obscuring stars of the fifth and sixth magnitude, and had continued his observations every night till the present one; obtaining satisfactory proof, as far as one set of observations conducted under some disadvantages in relation to the weather, which was cloudy during part of the time, that the hypothesis had failed in the prediction of an unusual meteoric display on or about the morning of the 13th of Nov. of the present year. The discussion was continued by Messrs. Rogers and Johnson: the latter gentlemen also stated

that the snow storm which commenced in this city at 10 o'clock, on Saturday night, was observed in Baltimore at 9 o'clock, travelling more rapidly south of the city than in the opposite direction.

Professor Bache stated that a joint committee of the American Philosophical Society and the Franklin Institute had prepared a circular for inducing observations on the subject of meteorology, to which he would direct the attention of the members.

November 25th.

The committee on Dr. R. Coates' paper on Molluscous animals, reported in favor of its publication; report accepted and the committee discharged.

The committee on Mr. H. D. Rogers' paper on the trap formation near New Hope, reported in favor of publication; report accepted and the committee discharged.

December 20th.

Donations.—A specimen of Zeolite from the Giant's Causeway, presented by Mr. John Reese.

A TRITON *melamphus* from India, by Mr. Jos. Clark.

Advocate of Science and Annals of Natural History, No. 4, by the editor.

Professor A. D. Bache read a paper by Mr. John W. Draper, entitled "Experiments to ascertain what influence light has in producing magnetic action."

Dr. Harlan stated that Col. Long had lately brought to the city a few specimens of caudal vertebra of the Mososaurus, found in secondary limestone, obtained from Erie, on the Black Warrior River, Alab.—that some citizens of that place, after boring through strata of gravel, rotten limestone, sand and rotten limestone, found a deposit of leaves at the depth of five or six hundred feet below the surface, which Dr. H. presumed to be in cavernous limestone.

Professsor Bache stated that the late solar eclipse had been observed by many persons in this city and its vicinity—by Professor Courtenay, Mr. Jos. Roberts, Mr. S. C. Walker, Mr.

Espy and Mr. Riggs, in the city, and by Mr. Lukens and Mr. Wistar at Germantown, and that a comparison of the times confirmed the conclusion, that observations of the times of beginning and end of solar eclipses afford only approximate determinations of the longitude of places at which they are made.

Dr. Harlan stated, that he had seen a letter from the Hon. Daniel Webster, stating that the vessel which had been sent to the north-west coast with provisions &c. to the party to which Messrs. Nuttall and Townsend were attached, had been struck by lightning off Cape Horn, and was obliged to return without rendering them the contemplated assistance.

CIRCULAR TO METEOROLOGISTS.

THE following is a part of the circular alluded to by Professor Bache, at the Academy of Sciences. The form of the journal the committee proposes is similar to that of the journal of the weather published in the Advocate, except that they note the dew point, and the time of the beginning and end of rains. The plan which the committee thus suggests is one which will lead to important results, provided a sufficient number of individuals will be found to interest themselves in the case. It may be known to many, that the hours which they recommend these observations to be taken, are not those which will give either the minimum or maximum temperature of the day. But the idea is to obtain *simultaneous observations;* and if the thermometer or barometer varies to any remarkable extent before or after the hours stated, it will be well to note these variations also. We observe that a good weather journal is published in the Western Monthly Magazine, an interesting and well conducted periodical, issued at Cincinnati. We hope other journals will follow the example:

The prime object of this circular is to obtain a complete knowledge of all the phenomena accompanying one or more storms of rain or hail, not only where the violence of the storm is felt, but at and beyond its borders, its beginning and its end.

For this purpose you are requested to commence a journal

of the weather, noting the direction of the wind at the surface of the earth and in elevated strata, as indicated by the clouds, which may frequently be seen at different elevations, moving in different directions; the upper current of all being at Philadelphia, generally from some western point. Let the strength and direction of the wind, and the appearance of the heavens as to clear or cloudy, and the character of the clouds, according to your own mode of description, be noted at least three times a day, as near the following hours as convenient: 7 A. M., 2 P. M., and sunset. Let the heavens, however, be examined very often, so that any sudden change may not pass unobserved, especially in the direction of the wind; and when any occurs, let it be noted, with its time, under the general head of "observations."

The plan which we recommend in observing slow moving clouds, is to keep the head steady in one place, with the top of a chimney, or some distant fixed object, between the eye and any remarkable point of the cloud, until this point shall have moved so far behind the object as to leave no doubt of its direction.

As to upper and lower strata, when one passes under the other, there is an optical deception to be guarded against when the upper one moves with the greatest angular velocity. This deception may generally be avoided by noticing which cloud is obscured by the other as they pass. Sometimes, also, an upper current of air may be detected when there is but one stratum of clouds, if these are of the columnar snowy-topped kind, which are frequently seen in a hot summer day: as these clouds are frequently formed between currents, their tops will lean in the direction of the upper current, and, indeed, sometimes be blown off and dissipated, in a direction different from the air below.

We also particularly request, that if you hear of any storms occurring in your neighborhood, you will collect all the information concerning them in your power.

Particularly inquire the course of the wind at the commencement of the storm and at its termination; the width of the storm; its direction; its velocity; the direction of the wind at

its sides; how the wind veers round—whether in different directions at its sides or not; whether, in case of hail, there are two veins or only one; where there is the greatest fall of rain, near the borders or near the centre of the storm, and whether this fall takes place near the beginning, middle, or end of the storm; whether the clouds are seen moving with the wind or against it, and whether differently among themselves; and every thing else which you think may tend to an explanation of this most interesting phenomenon.

Let the time of beginning and end of all rains be particularly noted, any change in the strength and direction of the wind during their progress, and the quantity as near as possible. Mark the time of meteors, or shooting stars, and if possible, the stars through which they pass. These observations, if made by very many correspondents throughout the United States, will elucidate the main object which the committee has in view in the present circular, and it is hoped, greatly assist in giving interest and value to the plan in contemplation. But as many observers may be willing to do more, we will remark that the observations on storms will be much enhanced in value, if accompanied by observations on the "dew point;" for it may be, that hurricanes never occur only when the dew point is high.

A very simple, as well as accurate method of taking the "dew point," is to use a thin tumbler of tin, kept very bright and clean on the outside—and in the summer cold water, and in the winter snow or ice, and if necessary, salt mingled with water—and when these are not at hand, a mixture of muriate of ammonia and nitrate of potash, in equal quantities, pounded very fine, put into the tumbler with water. By any of these means a temperature may soon be obtained below the "dew point." When dew settles on the tumbler, it must be carefully wiped off, very dry, and the fluid within stirred with a thermometer; and this must be repeated until the fluid is gradually heated up by the air, so that the moisture ceases to settle: the highest temperature at which it will settle, is the "dew point."

For observations of the dew point to be of any value, how-

ever, they must be made constantly, every day, at least once a day.

Again, some may be unwilling to take the dew point, who would be glad to know how it may be obtained, approximately, by the following indirect method:

Take two thermometers that agree, or allow for the difference—cover one of them with a wet white rag, and swing them simultaneously in the air, (for it will not do to let them be at rest, unless the wind is blowing fresh;) when it is discovered that they cease to change by swinging, take 103 times their difference, and divide it by the wet-bulb temperature, and subtract the quotient from the temperature of the naked bulb—the remainder will be the dew point. This formula is founded on experiments from 20° Fahr. to 80°, and does not differ, at either extreme, from the most careful experiments. We cannot refrain from saying, we are sure that every lover of the science will be richly rewarded for all the pains he may bestow on the dew point, even independent of the results which will undoubtedly be derived from a comparison of these simultaneous observations.

In conclusion, the committee request that, should your occupations prevent you from attending to the subject yourself, you will find in your vicinity a competent observer to take your place.

Please to forward your observations monthly, to the *Joint Committee of the American Philosophical Society and Franklin Institute, care of William Hamilton, Actuary of Franklin Institute, Philadelphia,* by mail, when a private conveyance is not at hand.

JAMES P. ESPY, Chairman Joint Committee.

GOUVERNEUR EMERSON, M. D.
C. N. BANKER,
ALEXANDER D. BACHE,
} Com. of Amer. Philos. Society.

JAMES P. ESPY,
ALEX. D. BACHE,
H. D. ROGERS,
S. C. WALKER,
P. B. GODDARD, M. D.
} Com. of Franklin Institute.

JOURNAL OF THE WEATHER FOR SEPTEMBER, 1834.

Moon.	Days mo.	Ther. Sunrise	Ther. Mid-day	Ther. 11 P. M.	Barometer. Sun-rise	Barometer. Mid-day	Barometer. 11 P.M	Winds. Morn-ing	Force	Winds. After-noon	Force	Winds. Even-ing	Force	Clouds. Course of clouds	Rain	Observations.
●	1	63	66	63	29.83	29.82	29.82	NE	3	NE	2	NE	1	SW?	1.40	Rain
	2	63	70	66	.90	.98	30.00	NE	1	NE	1	NE	1	SW.	.35	Rain—cloudy
	3	66	80	70	30.08	30.00	.03	E	0	SSW	0	S	0	WSW		Mostly clear
	4	69	84	73	.01	29.96	29.90	S	2	SSW	3	N	2	NE	.04	Partly clear—rain
	5	72	74	67	29.75	.68	.60	SE	2	NNE	2	N	2	SW	1.30	Cloudy—rain—clear
	6	66	80	68	.65	.71	.99	NE	1	N	1	N	0	NW		Mostly clear.
	7	68	85	63	.82	.80	.90	SE	1	SW	2	N	3	SW	1.15	Partly clear—2 th. gusts
	8	62	74	71	.90	.80	.75	E	2	SSW	2	SW	2	SW		Cloudy—rain—lightning
☾	9	71	75	63	.70	.67	.66	WSW	2	W	2	NE	1	WSW	.30	Partly clear—shower.
	10	60	67	53	.66	.66	.70	W	3	NW	4	NW	1	NW		Clear
	11	47	63	50	.80	.85	30.00	NW	3	NW	2	N	2	NW		Clear
	12	46	64	50	30.18	30.18	.23	NW	2	NW	2	N.	2	NNW		Clear
	13	51	64	51	.30	.33	.33	E	1	SE	0	N	0	NW		Cloudy—clear
	14	47	69	53	.34	.35	.33	E	0	S	0	N	0	NE		Clear
	15	49	71	53	.26	.23	.11	E	1	S	0	S	0	SE		Clear
	16	51	74	58	.09	.06	.00	SE	0	SSE	0	E	1	S		Clear
○	17	57	64	67	29.95	29.90	29.86	NE	3	NE	3	S	1	SW?	.70	Cloudy—rain
	18	66	73	67	.80	.75	.75	S	1	SSE	1	N	0	S	.12	Cloudy—rain
	19	66	75	61	.76	.78	.80	N	1	NW	2	NW	0	W		Partly clear
	20	60	72	60	.83	.82	.81	NW	2	NW	1	NW	0	W		Clear
	21	59	73	64	.79	.75	.75	SW	2	SSW	2	SW	1	SSW		Cloudy
	22	56	72	61	.80	.80	.80	N	2	S	1	NE	1	WSW		Clear—cloudy
	23	58	74	64	.75	.75	.75	ENE	1	S	0	NW	3	WSW	.65	Rain—cloudy
	24	59	64	58	.82	.80	.89	ENE	1	S	0	NW	0	WSW	.05	Cloudy—rain.
☽	25	55	71	58	.90	.96	30.10	WSW	1	SW	1	W	1	SSW		Mostly clear.
	26	56	72	63	30.10	30.10	.00	NE	1	SE	1	W	1	SE		Mostly cloudy
	27	61	75	64	29.90	29.84	29.79	E	0	SW	1	W	1	W	.30	Cloudy—clear
	28	60	51	48	.85	.87	.90	N	1	NNE	1	N	1	WSW		Cloudy—rain
	29	46	56	41	30.00	30.10	30.20	NW	3	NW	1	NW	1	NNW		Clear
	30	37	53	53	.30	.32	.36	NE	2	SSE	2	SSE	1	NNW		Clear—cloudy—frost

☞ The foregoing observations on the thermometer, barometer, and winds, are taken three times a day; at sunrise, mid-day and 11 P. M. In the column representing the force of the wind, 0 denotes calm or nearly so, 1 a light breeze, 2 a breeze, 3 a wind, 4 a high wind, and 5 a very high wind. The two additional columns denote the direction in which the clouds were observed to move; the former column referring to the upper stratum of clouds, and the latter to the lower, when two different strata were visible.

SUMMARY.

Average at sunrise, thermom.	58°23	—barom.	29.927	inch.
Do. mid-day,	do.	70°53	do.	29.921	do.
Do. 11 P. M.	do.	60°03	do.	29.937	do.
Monthly average,	do.	64°38	do.	29.924	do.
Maximum (7th)	do.	85°	do.(30th)	30.36	do.
Minimum (30th)	do.	37°	do. (5th)	29.60	do.
Range	do.	48°	do.	76	do.
Warmest day (4th)	do.	76°5			
Coldest day (30th)	do.	50°			

Proportion of clear weather, ...	15 days.
Do. cloudy do.	15 "
Whole days clear, ...	9 "
Days on which rain fell, ...	12 "
Quantity of rain, ...	6.76 inches.
Northerly winds prevailed, (proportion,)	9 days
Easterly do. do. do. . .	12 "
Southerly, do. do. (S. to W.)	9 "

Observations.—No auroras. Clouds electrified on six days; two complete thunder gusts, both of which occurred on the 7th. Six easterly storms, all light and transient except two, and all attended with rain. Rains frequent and copious, more particularly in the early part of the month; rain fell on seven of the first nine days. Winds variable, and light; a high wind blew only one day in the whole month. Temperature mostly uniform, and below the usual standard for September. On the mornings of the 11th and 12th there was a slight frost in some favorable situations near Wilmington, and on the 30th there was a general white frost, with ice in some places.

JOURNAL OF THE WEATHER FOR OCTOBER, 1834.

Moon.	Ther.!	Barometer.			Winds.				Clouds.	
	Days mo.	Sunrise	Mid-day	11 P.M.	Morning.	Force	Afternoon	Force	Evening.	Force	Course of clouds	rain in.	Observations.
●	1 50	08	09	29.90	29.82	29.70	SE	2	SSW	2	SW	2	W	SSW	.74	Cloudy—rain
	2 69	76	64	.68	.68	.73	SW	3	WSW	2	WNW	1	WSW	SW		Cloudy—clear
	3 54	79	55	.85	.85	.85	NW	1	NW	1	NW	0		NW	.22	Clear
	4 58	73	61	.75	.75	.76	SW	3	NW	3	NW	1	WSW			Clear—cloudy—shower
	5 50	58	45	.82	.89	30.00	NW	3	SW	3	NNW	1		NW		Clear
	6 42	59	45	30.10	30.16	.18	N	1	SW	0	NW	0				Mostly clear
	7 43	66	55	.18	.12	.05	SW	2	SW	1	O	0	S		.08	Cloudy—rain
	8 58	69	62	.0	29.90	29.89	SW	2	SW	2	SW	0	SW	SW	.08	Mostly cloudy—rain
☽	9 62	74	54	29.76	.65	.65	SW	2	W	3	NW	0	SW	SSW		Clear
	10 57	55	40	.00	.02	.62	NW	4	NW	3	N	0		NW		Clear
	11 37	56	42	.80	.95	30.15	NE	1	S	2	NW	0				Clear
	12 40	64	50	30.25	30.10	29.90	SW	2	SW	2	W	0	W	SW	.06	Mostly cloudy—rain
	13 48	57	42	29.85	29.80	.83	W	1	N	3	NNW	2	WSW	W-N		Clear
	14 38	46	38	.80	.78	.89	NNW	2	NW	2	N	0	W	NW		Mostly clear
	15 29	46	41	.70	.75	.87	E	1	SE	0	NW	0	WSW			Clear—cloudy
	16 34	56	50	30.05	30.05	30.15	NE	1	S	1	SSW	0	WSW			Cloudy—clea.—hazy
○	17 57	73	54	.29	.23	.23	SSW	2	SW	2	WSW	0	SW			Mostly clear—hazy
	18 51	74	60	.20	.00	.00	SSW	3	SSW	3	SSW	3	W		1.22	Rain—clear
	19 45	41	36	29.87	29.85	29.80	NNW	2	NW	2	NW	3	SW	NNW		Clear
	20 33	46	35	.70	.65	.65	NW	3	NW	2	NW	0		NW		Clear
	21 33	51	37	.68	.75	30.05	NW	1	NW	1	W	0	WNW			Cloudy—clear
	22 34	55	43	30.07	30.07	29.95	W	1	W	1	W	0	W			Clear—hazy
	23 39	53	39	29.90	29.85	.86	NW	3	NW	3	NW	0				Clear—hazy
	24 32	53	36	.95	.98	30.04	NW	1	NW	1	N	0				Clear—cloudy
☽	25 36	51	44	30.15	30.18	.10	E	1	E	1	E	1	WSW			Cloudy—clear
	26 51	58	45	29.95	29.60	29.56	SW	2	NW	3	NW	3	WSW	SW	.5	Cloudy—rain-t. & l.—clear
	27 37	50	44	.65	.65	.66	NW	2	W	2	NW	1	W			Clear
	28 35	50	40	.68	.72	.78	NW	2	NW	1	NNE	1	W?			Clear—hazy
	29 34	46	32	.90	30.02	30.08	SE	1	S	1	ESE	2	W?			Clear—hazy
	30 31	50	42	30	20	.20	E	1	E	1	NNE	0	WSW			Cl ar—cloudy
	31 38	49	39	.30	.23	.35	NNE	1	NNE	1	NNE	1	W?			Clear—hazy

SUMMARY.

Average at sunrise,	thermom.	43.52	—barom.	29°923	inch.
Do. mid-day,	do.	58°13	do.	29.903	do.
Do. 11 P. M.	do.	46°48	do.	29.92	do.
Monthly average,	do.	50°875	do.	29.913	do.
Maximum (3d)	do.	79°	do.(31st)	30.36	do.
Minimum (15th)	thermom.	29°–	barom.(26th)	29.56	inch
Range,	do.	50°	do.	.80	do.
Warmest day (2nd)	do.	72°5			
Coldest day (15th)		37°5			

Proportion of clear weather, ...	22 days
Do. cloudy do.	9 "
Whole days clear do.	15 "
Days on which rain fell	7 "
Quantity of rain	2.90 inches.
Northerly winds prevailed (proportion) .	15 days
Easterly do. do. do.	3 "
Southerly (S. to W.) do.	13 "

Observations.—No auroras. Clouds electrified on two days. Two abortive easterly storms, but not a single complete one. Rains at seasonable intervals, but generally very light. The quantity was less than usual for this month. Winds moderate as in September: only one high wind during the month. They were not very changeable, but prevailed from north to south on the western side of the compass. It is remarkable that, as the journal shows, easterly winds blew only for three days out of the thirty-one. The temperature was almost uniformly cool, being several degrees below the average for October. On the 15th was the first general ice.

The fall of 1834 has been a cool one, without a great deal of rain. Northerly winds have prevailed; which affords some reason for anticipating an early winter.

MISCELLANIA.

1. *Curious springs.*—In Oahu, one of the Sandwich islands, are a number of wells, in which the water is perfectly free from salt, though it invariably rises and falls with the tides of the ocean. They are from one hundred yards to three quarters of a mile distant from the sea. This water is uniformly found on penetrating a number of feet into a stratum of porous calcareous rock which underlies the soil. It is difficult to account for its freshness, unless, as is suggested by Ellis, who furnished the statement, it is deprived of its salt by filtering through the rock.

2. *Heat produced by friction.*—Sir Humphrey Davy proved that two pieces of ice rubbed together in an atmosphere at 32 degrees, or at the freezing point, are converted into water. A piece of ordnance is heated much sooner by constant discharges than if filled with burning coals for ten times as long a period. These facts are adduced, among others, by the advocates of the immateriality of heat and light, to support their theory, which attributes heat and light to vibratory motions among the particles of bodies, and in a supposed etherial medium.

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3. *Powerful current of air in Teneriffe.*—It is stated in Ure's Geology, that on the top of the peak of Teneriffe, the wind blows for the most part so strongly from south-west, that a person finds difficulty in standing upright against it. This current may be a part of the current which is supposed to be constantly flowing from the tropics toward the poles in the elevated regions of the air, caused by the rarification of the atmosphere on the earth's surface by the sun. The rarified air of course rises, and then flows over on either side. From a south, it becomes a south-westerly current, in consequence of the diminishing velocity of those portions of the earth over which it passes, the wind retaining the momentum which it had acquired at the equator, in moving with the earth's surface in an easterly course.

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4. *Cotton Seed Oil.*—The editor of the Mobile Advertiser writes his paragraphs by the light of a lamp filled with cotton seed oil, and he has no hesitation in pronouncing it every way equal to sperm oil. Besides the flame being whiter and clearer than that produced by the best winter strained sperm oil, it is less apt to smoke, and when it does smoke, gives not forth an offensive odor. He forgot to tell us the amount of oil which can be obtained from a given quantity of seed.

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5. *Mortality of cities.*—Dr. Bisset Hawkins states the annual mortality in Paris to be one in every 35; in Berlin one in every 53; and in London only one in 40.

6. *Interesting scientific Fact.*—It is well known that at the period of the great earthquake at Lisbon, the waters of Lochness in this neighborhood, were agitated considerably, as if by a violent storm, and rose about a foot above their ordinary level. The extreme depth of the lake, which in some places is as much as 130 fathoms, was considered the cause of this remarkable phenomenon; but we observe an equally extraordinary fact recorded by an English paper, the Brighton Gazette. On the day of the late eruption of Mount Vesuvius, which was the most violent that has occurred in the memory of the present generation, an earthquake took place at Chichester. Could any subterranean communication have caused this coincidence? We can hardly believe that it was accidental.—*Inverness Courier.*

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7. *The way to catch ducks.*—A gentleman lately brought up from Old Point a shell-drake with its bill enclosed between the shells of an oyster, which had been picked up as it was drifting to the shore, by the toll keeper of the drawbridge at the mouth of Mill Creek. The shell-drake being a great diver, is supposed, in one of his submarine visits, to have found the oyster resting on the sandy bottom, with its valves distended, and presenting too great a temptation for any hungry duck to withstand, he without ceremony thrust in his long narrow bill to extract the delicious morsel; when the oyster, not approving of such familiarities, suddenly collapsed the portals of its little citadel, and held the intruder's head under water until it suffocated him; while, unable or unwilling to let go his hold, both oyster and duck were borne to the shore by the refluent tide.

Raccoons have frequently been caught in the same sly way; being exceedingly fond of oysters, they take advantage of a very low tide and a moonlight night, to prowl along the shore in search of their favorite prey, which they are sure to find with mouths agape. The knowing ones, it is said, drop a pebble into the opening before they venture to put a paw in; but the uninitiated of the tribe, forgetting this precaution, are taken prisoners.—*Norfolk (Va.) Paper.*

8. *Gypsies.*—In England, gypsies are still pretty numerous, but found only in distant places, seldom coming into the towns excepting in small companies of two or three persons. In Germany, Sweden and Denmark they have become rare, as also in Switzerland and the Low Countries. In Italy their numbers are diminished. In Spain it is said there are 50 or 60,000 of them. In Transylvania they are most numerous; for in a population of 1,700,000 souls, there are reckoned 104,000 gipsies. We do not exaggerate in estimating the Tzengarian or gipsy population of Europe at nearly a million; in Africa 400,000; in India at 1,500,000, and about 2,000,000 in all the rest of Asia—for except in Asiatic Russia, China, Siam, and Japan, they are every where to be found. Hence we may deem the total population of these people to be 5,000,000.

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9. *Meteorological Stone.*—A Finland Journal gives an account of a singular stone in the north of Finland, which answers the purpose of a public barometer. On the approach of rain, this stone assumes a black or dark grey color, and when the weather is inclined to be fair, it is covered all over with white specks. This stone is, in all probability, an argillacious rock, containing a portion of rock salt, ammonia or salt-petre, and absorbing more or less humidity, in proportion as the atmosphere is more or less charged with it. In the latter case, the saline particles, becoming crystallized, are visible to the eye as white specks.

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10. *Hydrographic Paper.*—M. Chevallier has examined a paper lately invented, which may be written on with a pen dipped in pure water. He found that it was prepared by soaking the sheets of paper in a solution of sulphate of iron, drying them, and then covering them with finely powdered galls. He states that similar papers may be prepared by using other solutions and powders; thus blue is probably prepared by powdering the paper, soaked in sulphate of iron, with ferrocyanate of potash.—*Journ. de Chim. Med. &. Journ. Pharm.*

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11. *Improvidence of the Esquimaux.*—As we trace the gradations of man, one of the most prominent characteristics will

be found in an improvident disposition, which increases in extent the further he is removed from intelligence, and the means of acquiring it. Thus the Esquimaux, who are among the lowest of our race, exhibit no more prudence in the management of their supplies, than many animals which have not mind to direct their actions. According to Capt. Parry, the moment that tidings transpire of the capture of a walrus or sea cow, (Trichechus *manatus*, Lin.) shouts of exultation are raised throughout the village; as its inhabitants share the prize in common. When it arrives, slices are instantly cut out, every lamp is supplied with oil, the houses are lighted, and all the pots filled with flesh; the women, while attending to the culinary operations, pick out and devour the most dainty morsels. When the feast is prepared, one man takes up a large piece of meat, applies it to his mouth, and severs with his teeth as much as that cavity can possibly admit; this done, he hands the remnant to his neighbor, and his neighbor to the next, and so on till all is consumed. A new piece is then supplied, and thus the process is continued, almost without intermission, till the animal is entirely consumed. There seems scarcely any limit to the capacity of an Esquimaux stomach. Some experiments on the subject were made on board the Fury, and the results carefully noted, which proved to be most surprising. A youth named Toolooak stands recorded as having, in twenty-one hours received into his stomach ten pounds four ounces of solid food, a gallon and a pint of water, together with more than a pint of soup. Capt. Lyon pitched against him Hangara, who, in nineteen hours consumed nine pounds fifteen ounces of solid and a gallon and a half of fluid. Hence we may perceive that the most ample store very speedily disappears; one day they are laboring under fever, hæmorrhage, and all the evils incident to repletion; a few days after, they are without a morsel to eat.

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12. *Curious habits of Insects.*—It is well known that the nearer we advance to the tropics, the more numerous and troublesome are certain insects, which, abounding along valleys and swamps, delight in annoying flesh and blood; and on the Oronoko, when two persons meet in the morn-

ing, the first questions are, "How did you find the zancudoes during the night?" "How are we to-day for the mosquitoes?" Humboldt states it as a remarkable fact, that on the streams, the water of which is of a yellowish brown color, the flies of the genus *Tipularia* do not make their appearance. And not less astonishing is the fact that the different kinds do not associate together; but that at certain hours of the day, distinct species, as the missionaries say, mount guard. From half after six in the morning till five in the afternoon, the air is filled with mosquitoes of the genus *Simulium*, which resemble a common fly. An hour before sunset small gnats, called *temproneroes*, succeed them, to disappear between six and seven. After which zancudoes, a species of gnat with very long legs, come abroad and continue until near sunrise, when the former again take their turn. Persons born in the country, whether whites, mulattoes, negroes, or Indians, all suffer from the sting of these insects, although none so severely as Europeans who have recently arrived. A missionary, observing that the insects were more abundant in the lowest stratum of the atmosphere, had constructed near the church a small apartment supported upon palm trunks, to which he retired in the evening.

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13. *Education in the West.*—A Pittsburg paper states that there are upwards of five hundred adults in that city who can neither read nor write. From this circumstance we might infer that the means of education are restricted in the country west of the mountains. But we observe in an interesting periodical alluded to in another page of our journal,—the Western Monthly Magazine,—a statement doubtless new to most of our readers, which will probably produce a different impression. That New England, with a population of near 2,000,000, has 1758 students in her colleges; and in the western states, containing a white population of 2,500,000, there are reported to be 1696 pupils, which the editor believes to be 200 short of the actual number, thus increasing the amount to 1900. Together with these, the New England colleges contain a large number of southern and western pupils, which would reduce the sum to 1300. Thus, the amount of youth who are liberally edu-

cated will be found greater, in proportion, in the western states, than in New England. Besides this, there are but twelve colleges in the latter country, while, including five in the western part of Pennsylvania, the former possesses twenty-five. In addition to these, there are numerous good schools, and the editor conceives that in Kentucky, in particular, the female mind is as highly cultivated as in the eastern states. A circumstance from which he contemplates much improvement in the coarser composition of our western fellows; knowing, as he does, the influence which a well educated female can exert in society.

But apart from this, we do not conceive that the defect of education in the west is to be altogether attributed to the state of schools; for there are many who emigrate there with their families from the eastern coast, and among these, foreigners lately introduced to the country, who may be ranked among the most ignorant of our citizens—who can neither read nor write. And a new country, above all others, is not the place for the poor laborer, either to teach himself or to have his children taught in the elementary principles of knowledge. But it cannot be denied that our country schools are too incompetent to prepare the untutored mind for the important and responsible duties of manhood. Too often is it the ignorant empiric, who is entrusted with a charge not beneath the guardianship of the most elevated and shining genius; and too often is a child made to tremble at the approach of a worthless tutor, whose tyranny imposes exhorbitant requisitions on the youthful intellect, which, even if complied with, would only cause an ignorant preceptor to extend a cruel aid to precocious genius, which would lead its unhappy possessor the sooner into a state of premature debility of mind, and dissolution of body. But as we did not contemplate writing an essay on education, we will close our paragraph by giving the following schedule of the acts of a schoolmaster, from the Encyclopœdia Americana:

"Hauberle and Neuman relate, that John James Hauberle, the schoolmaster of a small Suabian town, during the fifty-one years and seven months in which he performed the duties of his office, according to a *moderate calculation*, gave the youth

entrusted to his charge 911,517 blows with a stick, 24,010 strokes with a rod, 20,989 ferulings, 136,715 blows with the hand, 10,235 slaps upon the chops, 7,905 boxes on the ears, 1,115,800 raps on the head, and 12,763 notabenes with the Bible, catechism, psalm book and grammar; 777 times he made the boys kneel upon peas, and 613 times upon a three cornered piece of wood. He obliged 5,001 scholars to wear the picture of an ass upon the breast, and 1707 to hold out the rod; not to mention the punishments which were inflicted *ex tempore*. Of the blows with a stick, 800,000 were for not learning Latin vocabularies, and of the strokes with a rod, 7,600 were for not learning passages of the bible and hymns."

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14. *Honey of Trebizond.*—Mr. K. E. Abbott, in a letter read before the Zoological Society of London, gave some account of the famous honey of Trebizond, spoken of by Xenophon in his history of the retreat of the ten thousand Greeks, as having produced the effect of temporary madness, or rather drunkenness on all who eat of it, without, however, causing any serious consequences. It is supposed to be from the flowers of the *Azalea Pontica* that the bees extract this honey, that plant growing in abundance in this part of the country, and its blossoms emitting the most exquisite odor. The effect which it has on those who eat it, is, as Mr. Abbott has witnessed, precisely that which Xenophon describes; when taken in a small quantity it causes violent head ache and vomiting, and the unhappy individual who has swallowed it, resembles as much as possible a tipsy man; a large dose will completely deprive him of all sense and power of moving for some hours afterwards.—*Philos. Mag.*